

AMENDMENTS TO ~~THE~~ CLAIMS: This listing of claims replaces all prior versions and listings of claims in the instant patent application.

Listing of claims:

- Claim 1 (canceled)
2. (canceled)
3. (currently amended) A method according to claim 27, 28, 29, ~~or~~ 30, 34, 35, 52, 53, 54, 55 or 56, wherein said first and second oligonucleotides are labeled.
4. (previously presented) A method according to claim 3, wherein said first and second oligonucleotides bear different labels.
5. (currently amended) A method according to claim 27, 28, ~~or~~ 29, 30, 34, 35, 52, 53, 54, 55 or 56, wherein said first and second oligonucleotides are attached covalently through said first and second linkers respectively, to said substrate.
6. (canceled)
7. (currently amended) A method according to claim ~~27 or 30~~, 27, 29, 30, 34, 35, 52, 53, 54, 55 or 56, wherein said substrate comprises discrete sites to which said first and second oligonucleotides may be linked.
8. (canceled)
9. (currently amended) A method according to claim 27, ~~29 or 30~~ 28, 29, 30, 34, 35, 52, 53, 54, 55 or 56, further comprising synthesizing said first and second oligonucleotides on said substrate.
10. (original) The method according to claim 9, wherein said first and second oligonucleotides are synthesized by a synthesis method selected from the group consisting of printing and photolithography.

Claims 11-26 (canceled)

27. (currently amended) A method for multiplex detection of target nucleic acids comprising:

- a) providing a substrate comprising at least first and second ~~different~~ oligonucleotides linked to said substrate through first and second cleavable linkers, respectively, said first and second oligonucleotides having sequences different from each other;
- b) cleaving said first and second linkers, thereby releasing said first and second oligonucleotides from said substrate thereby generating a pool of oligonucleotides comprising said first and second ~~different~~ oligonucleotides;
- c) contacting said first and second oligonucleotides with a composition comprising at least a first and second target nucleic acid, whereby said first and second target nucleic acids hybridize with said first and second oligonucleotides;
- d) modifying said first or second oligonucleotides hybridized with said first and second target nucleic acids to produce modified first or second oligonucleotides, and
- e) contacting said modified first or second oligonucleotides with a substrate comprising at least first and second ~~different~~ probe oligonucleotides, said first and second probe oligonucleotides having sequences different from each other and having sequences different from said first and second oligonucleotides released from said substrate, whereby said target nucleic acids are detected.

28. (currently amended) A method for multiplex detection of target nucleic acids comprising:

- a) providing an array comprising a substrate and a population of oligonucleotides, said population comprising at least first and second subpopulations comprising at least first and second ~~different~~ oligonucleotides, respectively, said first and second oligonucleotides having sequences different from each other, said first and second oligonucleotides being immobilized to first and second beads, respectively, through first and second cleavable linkers respectively, said first and second beads being distributed on said substrate;
- b) cleaving said first and second linkers, thereby releasing said first and second subpopulations from said first and second beads, thereby generating a pool of oligonucleotides comprising said first and second ~~different~~ oligonucleotides;

- c) contacting said first and second oligonucleotides with a composition comprising at least a first and second target nucleic acid, whereby said first and second target nucleic acids hybridize with said first and second oligonucleotides;
- d) modifying said first or second oligonucleotides hybridized to said first and second target nucleic acids to produce modified first or second oligonucleotides, and
- e) contacting said modified first or second oligonucleotides with an array comprising a substrate and a population of oligonucleotides ~~population~~ comprising at least first and second subpopulations comprising at least first and second ~~different~~ probe oligonucleotides, said first and second probe oligonucleotides having sequences different from each other and having sequences different from said first and second oligonucleotides released from said substrate, whereby said target nucleic acids are detected.

29. (currently amended) A method for multiplex detection of target nucleic acids comprising:

- a) providing an array comprising a substrate and a population of oligonucleotides, said population comprising at least first and second subpopulations, wherein said first subpopulation comprises at least a first oligonucleotide and, wherein said second subpopulation comprises at least a second oligonucleotide, wherein said first oligonucleotide ~~is~~ has a different sequence from said second oligonucleotide and, wherein said first and second oligonucleotides are of known sequences, said first and second oligonucleotides being immobilized directly to said substrate through first and second cleavable linkers, respectively;
- b) cleaving said first and second linkers, thereby releasing said first and second subpopulations from said substrate thereby generating a pool of oligonucleotides comprising said first and second oligonucleotides;
- c) contacting said first and second oligonucleotides with a composition comprising at least a first and second target nucleic acid, whereby said first and second target nucleic acids hybridize with said first and second oligonucleotides;
- d) modifying said first or second oligonucleotides hybridized with said first and second target nucleic acids to produce modified first or second oligonucleotides, and
- e) contacting said modified first or second oligonucleotides with an array comprising a substrate and a population of probe oligonucleotides comprising at least first and second subpopulations, wherein said first subpopulation comprises at least a first probe oligonucleotide

and, wherein said second subpopulation comprises at least a second probe oligonucleotide, wherein said first and second probe oligonucleotides is have sequences different from each other ~~said second oligonucleotide~~ and, wherein said first and second probe oligonucleotides are of known sequence; and, wherein said probe oligonucleotides have sequences different from said first and second oligonucleotides released from said substrate, whereby said target nucleic acids are detected.

30. (currently amended) A method for multiplex detection of target nucleic acids comprising:

a) cleaving at least first and second ~~different~~ oligonucleotides linked to a substrate through at least a first cleavable linker from said substrate, thereby releasing said first and second oligonucleotides from said substrate generating a pool of oligonucleotides comprising said first and second ~~different~~ oligonucleotides, said first and second oligonucleotides having sequences different from each other;

b) contacting said first and second oligonucleotides with a composition comprising at least a first and second target nucleic acid, whereby said first and second target nucleic acids hybridize with said first and second oligonucleotides;

c) modifying said first or second oligonucleotides hybridized with said first and second target nucleic acids to produce modified first or second oligonucleotides, and

d) contacting said modified first or second oligonucleotides with a substrate comprising at least first and second ~~different~~ probe oligonucleotides, said first and second probe oligonucleotides having sequences different from each other and having sequences different from said first and second oligonucleotides released from said substrate, whereby said target nucleic acids are detected.

31. (canceled)

32. (canceled)

33. (currently amended) A method for multiplex detection of target nucleic acids comprising:

- a) providing a substrate comprising at least first and second ~~different~~ oligonucleotides linked to said substrate through first and second cleavable linkers, respectively, said first and second oligonucleotides having sequences different from each other;
- b) cleaving said first and second linkers, thereby releasing said first and second oligonucleotides from said substrate thereby generating a pool of oligonucleotides comprising said first and second ~~different~~ oligonucleotides;
- c) contacting said first and second oligonucleotides with a first and second target nucleic acid;
- d) modifying said first or second oligonucleotides contacted with said first and second target nucleic acid to produce modified first or second modified oligonucleotides;
- e) contacting said modified first or second oligonucleotides with a substrate comprising at least first and second ~~different~~ probe oligonucleotides, said first and second probe oligonucleotides having sequences different from each other and having sequences different from said first and second oligonucleotides released from said substrate, and
- f) detecting said target nucleic acid.

34. (currently amended) A method for multiplex detection of target nucleic acids comprising:

- a) providing an array comprising a substrate and a population of oligonucleotides, said population comprising at least first and second subpopulations comprising at least first and second ~~different~~ oligonucleotides, respectively, said first and second oligonucleotides having sequences different from each other, said first and second oligonucleotides being immobilized to first and second beads, respectively, through first and second cleavable linkers respectively, said first and second beads being distributed on said substrate;
- b) cleaving said first and second linkers, thereby releasing said first and second subpopulations from said first and second beads, thereby generating a pool of oligonucleotides comprising said first and second ~~different~~ oligonucleotides;
- c) contacting said first and second oligonucleotides with a first and second target nucleic acid;
- d) modifying said first or second oligonucleotides contacted with said first and second target nucleic acid to produce modified first or second oligonucleotides;

e) contacting said modified first or second oligonucleotides with an array comprising a substrate and a population of oligonucleotides comprising at least first and second subpopulations comprising at least first and second ~~different~~ probe oligonucleotides, said first and second probe oligonucleotides having sequences different from each other and having sequences different from said first and second oligonucleotides released from said substrate, and

e) detecting said target nucleic acids.

35. (currently amended) A method for multiplex detection of target nucleic acids comprising:

a) cleaving at least first and second ~~different~~ oligonucleotides linked to a substrate through at least a first cleavable linker from said substrate, thereby releasing said first and second oligonucleotides from said substrate generating a pool of oligonucleotides comprising said first and second ~~different~~ oligonucleotides, said first and second oligonucleotides having sequences different from each other; and

b) contacting said first and second oligonucleotides with a first and second target nucleic acid;

c) modifying said first or second oligonucleotides contacted with said first and second target nucleic acid to produce modified first or second oligonucleotides, and

d) contacting said modified first or second oligonucleotides with a substrate comprising at least first and second ~~different~~ probe oligonucleotides, said first and second probe oligonucleotides having sequences different from each other and having sequences different from said first and second oligonucleotides released from said substrate, and

d) detecting said target nucleic acids.

36. (previously presented) The method according to claim 27, 34 or 35, wherein said substrate is selected from the group consisting of glass, plastics, polysaccharides, nylon, nitrocellulose resins, silica, silicon, carbon, and metals.

37. (previously presented) The method according to claim 29, wherein said substrate comprises a chip.

Claims 38-51 (canceled)

5152. (currently amended) A method for multiplex detection of target nucleic acids comprising:

- a) providing a substrate comprising at least first and second ~~different~~ oligonucleotides linked to said substrate through first and second cleavable linkers, respectively, said first and second oligonucleotides having different sequences;
- b) cleaving said first and second linkers, thereby releasing said first and second oligonucleotides from said substrate thereby generating a pool of oligonucleotides comprising said first and second ~~different~~ oligonucleotides;
- c) contacting said first and second oligonucleotides with a first and second target nucleic acid;
- d) contacting said first and second ~~target nucleic acids~~ oligonucleotides in contact with said first and second target nucleic acid with a substrate comprising at least first and second ~~probe different~~ oligonucleotides, said first and second probe oligonucleotides having sequences different from each other and sequences different from said first and second oligonucleotides, said first and second probe oligonucleotides being distributed randomly on said substrate, and,
- e) detecting said target nucleic acid.

5253. (currently amended) A method for multiplex detection of target nucleic acids comprising:

- a) providing an array comprising a substrate and a population of oligonucleotides, said population comprising at least first and second subpopulations comprising at least first and second ~~different~~ oligonucleotides, respectively, said first and second oligonucleotides having sequences different from each other, said first and second oligonucleotides being immobilized to first and second beads, respectively, through first and second cleavable linkers respectively, said first and second beads being distributed on said substrate;
- b) cleaving said first and second linkers, thereby releasing said first and second subpopulations from said first and second beads, thereby generating a pool of oligonucleotides comprising said first and second ~~different~~ oligonucleotides;
- c) contacting said first and second oligonucleotides with a first and second target nucleic acid;
- d) contacting said first and second oligonucleotides in contact with said first and second target nucleic acid with an array comprising a substrate and a population of

oligonucleotides comprising at least first and second subpopulations comprising at least first and second different probe oligonucleotides, said first and second probe oligonucleotides having sequences different from each other and having sequences different from said first and second oligonucleotides released from said substrate, and

- e) detecting said target nucleic acids

54. (new) A method for multiplex detection of target nucleic acids comprising:

- a) providing a substrate comprising at least first and second oligonucleotides linked to said substrate through first and second cleavable linkers, respectively, said first and second oligonucleotides having different sequences;

- b) cleaving said first and second linkers, thereby releasing said first and second oligonucleotides from said substrate thereby generating a pool of oligonucleotides comprising said first and second oligonucleotides;

- c) contacting said first and second oligonucleotides with a composition comprising at least a first and second target nucleic acid, whereby said first and second target nucleic acids hybridize with said first and second oligonucleotides;

- d) modifying said first or second oligonucleotides hybridized with said first and second target nucleic acids to produce modified first or second oligonucleotides, and

- e) contacting said modified first or second oligonucleotides with a substrate comprising at least first and second probe oligonucleotides, said first and second probe oligonucleotides having sequences different from each other and having sequences different from said first and second oligonucleotides released from said substrate, said first and second probe oligonucleotides being distributed randomly on said substrate, whereby said target nucleic acids are detected.

55. (new) A method for multiplex detection of target nucleic acids comprising:

- a) providing an array comprising a substrate and a population of oligonucleotides, said population comprising at least first and second subpopulations comprising at least first and second oligonucleotides, respectively, said first and second oligonucleotides having sequences different from each other, said first and second oligonucleotides being immobilized to first and second beads, respectively, through first and second cleavable linkers respectively, said first and second beads being distributed on said substrate;

- b) cleaving said first and second linkers, thereby releasing said first and second subpopulations from said first and second beads, thereby generating a pool of oligonucleotides comprising said first and second oligonucleotides;
- c) contacting said first and second oligonucleotides with a composition comprising at least a first and second target nucleic acid, whereby said first and second target nucleic acids hybridize with said first and second oligonucleotides;
- d) modifying said first or second oligonucleotides hybridized to said first and second target nucleic acids to produce modified first or second oligonucleotides, and
- e) contacting said modified first or second oligonucleotides with an array comprising a substrate and a population of probe oligonucleotides comprising at least first and second subpopulations each comprising at least first and second probe oligonucleotides, said first and second probe oligonucleotides having sequences different from each other and having sequences different from said first and second oligonucleotides released from said substrate, whereby said target nucleic acids are detected.

56. (new) A method for multiplex detection of target nucleic acids comprising:

- a) providing an array comprising a substrate and a population of oligonucleotides, said population comprising at least first and second subpopulations, wherein said first subpopulation comprises at least a first oligonucleotide and, wherein said second subpopulation comprises at least a second oligonucleotide, wherein said first and second oligonucleotides having sequences different from each other and, wherein said first and second oligonucleotides are of known sequences, said first and second oligonucleotides being immobilized directly to said substrate through first and second cleavable linkers, respectively;
- b) cleaving said first and second linkers, thereby releasing said first and second subpopulations from said substrate thereby generating a pool of oligonucleotides comprising said first and second oligonucleotides;
- c) contacting said first and second oligonucleotides with a composition comprising at least a first and second target nucleic acid, whereby said first and second target nucleic acids hybridize with said first and second oligonucleotides;
- d) modifying said first or second oligonucleotides hybridized with said first and second target nucleic acids to produce modified first or second oligonucleotides, and

e) contacting said modified first or second oligonucleotides with an array comprising a substrate and a population of probe oligonucleotides comprising at least first and second subpopulations each comprising at least first and second probe oligonucleotides, said first and second probe oligonucleotides having sequences different from each other and having sequences different from said first and second oligonucleotides released from said substrate, said population of oligonucleotides being randomly distributed on said substrate, whereby said target nucleic acids are detected.

57. (new) A method according to claim 27, 28, 29,30, 34, 35, 54, 55 or 56, wherein said modifying step comprises sequencing or amplification.

58. (new) A method according to claim 27, 28, 29,30, 34, 35, 54, 55 or 56, wherein said modifying step comprises an assay selected from polymerase chain reaction (PCR), ligase chain reaction (LCR), cycling probe technology (CPT), Invader, oligonucleotide ligation assay (OLA) and single base extension (SBE).

59. (new) A method according to claim 27, 28, 29, 30, 34, 35, 52, 53, 54, 55 or 56, wherein said pool includes 20 or more different oligonucleotides.

60. (new) A method according to claim 27, 28, 29, 30, 34, 35, 52, 53, 54, 55 or 56, wherein said pool includes greater than 50 different oligonucleotides.